

REMARKS

Favorable reconsideration is respectfully requested.

The above amendment is responsive to points set forth in the Official Action.

The claims are 1-5. Claim 1 is currently amended.

The amendment to claim 1 is supported in example 1 of the specification.

No new matter is added.

Prior Art Rejections

Claims 1-5 are rejected under 35 U.S.C. § 102(e) as being anticipated by Ishii et al. (U.S. 6,689,920).

Claims 1-5 are rejected 35 U.S.C. § 103(a) as being unpatentable over Mitsui et al. (U.S. 6,521,735) in view of Amentani et al. (JP 2003-012796).

Applicants respectfully traverse each of these rejections.

1. The Present Invention

The present invention is directed to a process for the production of a bifunctional phenylene ether oligomer compound having no amine adduct represented by formula (1). The process comprises oxidatively polymerizing a bivalent phenol of formula (2) and a monovalent phenol of formula (3) in the presence of a copper-containing catalyst and a mixture consisting of a secondary amine having a secondary alkyl group, a tertiary alkyl group or an aryl group with a tertiary amine.

The present invention has succeeded in producing a bifunctional phenylene ether oligomer compound with no amine adduct, using only the above-specified two types of amines.

Each of the references cited by the Examiner use di-n-butylamine (hereinafter referred to as "DBA") as one of the amines. On the contrary, the present invention produces a bifunctional phenylene ether oligomer compound which has no amine adduct by using a mixture consisting of a secondary amine with a secondary alkyl group and a tertiary amine.

The attached Declaration under 37 C.F.R. §1.132 by Atsushi Hirashima, shows that amine adducts are generated in Supplemental Experiments 1, 2 and 3, and in Comparative Examples 1 and 3 of the present specification. In each of the aforementioned Supplemental Experiments and Comparative Examples, a secondary amine with no bulky substituent, such as DBA, was used. On the other hand, when a secondary amine with a secondary alkyl group and a tertiary amine as defined in present claim 1 are used (without DBA), a bifunctional phenylene ether oligomer compound is produced without the generation of an amine adduct.

Therefore, the present invention succeeds in producing a bifunctional phenylene ether oligomer compound having no amine adduct, by using a mixture consisting of a secondary amine with a secondary alkyl group and a tertiary amine as recited in present claim 1.

2. Ishii et al.

In each of Examples of Ishii et al., DBA, which is a secondary amine that has no bulky substituents, was used in combination with other amines. Ishii et al. do not disclose the use of a mixture consisting of a secondary amine having a secondary alkyl group and a tertiary amine as defined in present claim 1, or the benefits obtained by the present invention.

Moreover, a rejection under 35 U.S.C. §103 over Ishii et al. would be untenable since the present invention and the invention of Ishii et al. were subject to assignment to the same entity at the time the present invention was made. See 35 U.S.C. §103(c).

Accordingly, the rejection over Ishii et al. is overcome.

3. Mitsui et al.

Mitsui et al. disclose a process for producing a polyphenylene ether by, for example, oxidative polymerization of a monovalent phenol compound represented by formula (2) in the presence of a catalyst comprising a diamine compound represented by formula (1), a tertiary monoamine compound, and a secondary monoamine compound.

Each of the Examples of Mitsui et al. disclose only a process for producing a phenylene ether oligomer by oxidatively polymerizing a monovalent phenol compound using DBA in

combination with other amines. Therefore, Mitsui et al., for the reasons given above, do not teach or suggest the process of the present invention.

Amentani et al. disclose a process for producing a bifunctional phenylene ether oligomer compound represented by Formula (1) by oxidative polymerization of a bivalent phenol compound represented by Formula (2), and a monovalent phenol compound represented by Formula (3). Amentani et al. disclose in paragraph [0011] that an amine is used alone, or two or more amines are used in combination, and di-n-butylamine (DBA) is especially desirable as the amine. Amentani et al. also teach that homopolymerization of the monovalent phenol of Formula (3) is controlled by using DBA, and a bifunctional phenylene ether oligomer compound having a sharp molecular weight distribution is obtained. In each of the Examples of Amentani et al., DBA is used alone.

The Examiner states in the Official Action: "It would have been obvious to a person having ordinary skill in the art at the time of invention to have added divalent phenol to the reaction mixture of Mitsui et al. as in Amentani et al." See page 4 of the Official Action.

However, Amentani et al. disclose merely the use of the monovalent phenol and the bivalent phenol compound as starting materials. Amentani et al. do not teach or suggest the use of a mixture consisting of a secondary amine having a secondary alkyl group, a tertiary alkyl group or an aryl group with a tertiary amine as recited in claim 1. Furthermore, Amentani et al. do not suggest the benefits which are obtained by use of the presently claimed mixture.

As discussed above, Mitsui et al. disclose a process for producing a polyphenylene ether by oxidation polymerization of a monovalent phenol compound and do not teach or suggest the use of the presently claimed mixture consisting of a secondary amine having a secondary alkyl group, a tertiary alkyl group or an aryl group with a tertiary amine. The use of the presently claimed mixture is first disclosed by the present application.

Accordingly, even if Amentani et al. and Mitsui et al. are combined, one of ordinary skill in the art would not be able to arrive at the present invention. It would also be impossible to obtain the benefits of the present invention by combining Amentani et al. and Mitsui et al. Accordingly, the prior art does not disclose or suggest all of the features of the present invention and this rejection is overcome.

No further issues remaining, allowance of this application is respectfully requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact undersigned at the telephone number below.

Respectfully submitted,

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